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ABSTRACT

The intent of this study was to determine if attendance in a good quality prekindergarten program using developmentally appropriate activities had a positive effect on kindergarten mathematics readiness skills and achievement. Participating were 80 children, 4 to 6 years old, divided into two experimental and two control groups. Standardized test scores from the Slosson Kindergarten Readiness Test and the Metropolitan Assessment Package were used to compare the two groups. Each of the experimental groups attended one year of developmental prekindergarten, whereas the control groups had no preschool experience. The results indicated that the experimental groups scored significantly higher than control groups, suggesting that attending preschool had a positive effect on kindergarten mathematics readiness skills and achievement. (Contains 50 references.) (Author/KB)

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ED 430 701

A Study to Determine the Effects of Pre-Kindergarten on Kindergarten Readiness And Achievement in Mathematics

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A Thesis

Presented to

The Faculty of the Master of Arts Degree Program

Salem-Teikyo University

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in Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

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by

Donna G. Perry

February, 1999

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This thesis, submitted by Donna G. Perry, has been approved meeting the research requirements for the Master of Arts Degree.

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Abstract

The intent of this study is to determine if attendance in a good quality pre-kindergarten program that uses developmentally appropriate activities will have a positive effect on kindergarten mathematics readiness skills and achievement. The study involved eighty (80) four, five, and six year-old students. The students were divided into two experimental groups and two control groups. Standardized test scores were used to compare the two groups. Each of the experimental groups attended one year of developmental pre-kindergarten and the control groups had no preschool experience.

The experimental and control groups of children who were preschool age were given the Slosson Kindergarten Readiness Test and then compared. The Metropolitan Assessment Package was administered to the experimental and control groups of children who were in kindergarten. These results were then compared.

The results showed that the experimental groups scored significantly higher than the control groups which indicates that attending preschool does have a positive effect on kindergarten mathematics readiness skills and achievement.

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Chapter One

Introduction

"Kindergarten used to mean brightly colored paintings, music, clay, block building, bursting curiosity and intensive exploration" (Martin, 1985, p. 318), but today's trend leans toward a more structured, academic curriculum. Because of stricter accountability standards and increased pressure applied on local school districts for higher standardized test scores, kindergarten teachers must move quickly to help students achieve more in a shorter period of time. What used to be first grade work is now expected to be learned in kindergarten (Anderson 1995). This trickle-down effect does not leave much time for developmentally appropriate activities that help students learn and understand mathematical concepts, and it also takes away from the development of the love of learning. "The way math is taught in the early years of school affects not only math achievement and skill development, but also a child's disposition to learn" (Perlmutter, 1989). In order to understand and enjoy mathematics, children must literally reinvent it through their own daily explorations and with number games. A quality

pre-kindergarten can provide the age appropriate activities necessary to help students enter kindergarten confident in their abilities and interested in learning more about numbers.

According to the National Council of Teachers of Mathematics (NCTM) (1989), math is not a favored subject for upper elementary students, and many adults approach mathematics with a feeling of panic and fear. Traditional math instruction with drills, flash cards, and work sheets may lead to math anxiety. A quality pre-kindergarten experience can better prepare a child for the later, more traditional mathematics instruction by developing curiosity and confidence through math explorations and investigations.

Unfortunately, not all children have been afforded the opportunity to attend a good quality pre-kindergarten. Affluent parents have the means to select the school of their choice; parents from a lower socioeconomic status do not. According to Helen Blank and Barbara Reisman, only sixteen percent of eligible children participated in Head Start in 1989. Over two million disadvantaged youngsters were eligible for the program. The Federal government understands the need for building a new system for serving preschool children. Many more Head Start centers or high quality

pre-kindergartens in the public schools are needed to serve the children that now enter kindergarten without the advantage of experiencing preschool (Blank and Reisman, 1996).

Another advantage for children who attend preschool is the fact that parental involvement is highly encouraged and recommended. Many programs have been set up in the public schools to teach parents how to help their children toward higher achievement. Math manipulatives can be borrowed to be used at home for practicing one-to-one correspondence, sequencing, seriation, classification, and making patterns. This continued exploration of mathematics at home instills a feeling of competence and a favorable disposition toward problem-solving. Because early education programs often involve parents extensively, family processes may be impacted. Some long-term effects may include the attitudinal and behavioral measures of parent-child interactions, parent attitudes, school involvement, and educational experiences. Ideally, this will continue throughout the child's school years (Reynolds, Mavrogenes, Bezruczko, and Hagemann, 1996).

Giving children a positive, early understanding of mathematical concepts by using developmentally appropriate practices is possible by making sure that every child has the right to attend a quality pre-

kindergarten. Public schools in West Virginia are now using Title I funds to help ensure that every child who attends a Title I school has this right. Mercer County, located in southern West Virginia, now has transitional pre-kindergartens called Kindergarten Four programs in every Title I school in the county. Although attendance is not mandatory, most parents realize the importance of giving their children the opportunity to get a real head start in their education and are enrolling them in the Kindergarten Four programs. Every child benefits by this experience, especially in mathematics. Once a child has developed a love of learning math and has experienced the wonder of math explorations, confidence soars and he/she is ready to move on to a more structured form of mathematics instruction (Price, 1989).

The Statement of the Problem

Will pre-kindergarten experience in a classroom using developmentally appropriate activities have a positive effect on kindergarten mathematics readiness and achievement?

Hypothesis

The hypothesis of this study is that pre-kindergarten experience in a classroom using developmentally appropriate activities will have a positive effect on kindergarten mathematics readiness and achievement.

Purpose of the Study

The purpose of the study is to determine if children who attend a pre-kindergarten that uses developmentally appropriate activities will possess more kindergarten readiness skills in mathematics and will have higher achievement than those who do not attend this kind of facility.

Significance of the Study

Because many children enter kindergarten without prior experience from a school that uses developmentally appropriate activities, they do not possess the readiness skills necessary to achieve at acceptable levels. There are many steps that need to be taken to ensure readiness for mathematics. It is difficult to provide all the necessary time for these steps in kindergarten. If more students are exposed to developmentally appropriate pre-kindergarten experience, they will possess the needed readiness and will have higher achievement.

Assumptions

The assumption is that the students participating in this study are typical four, five, and six year-old children and that the instruments used are reliable and valid. It is also assumed that the students can be considered "at risk" since they attend a Title One public school. It can also be assumed that the sample is adequate in size and the time frame is adequate.

Limitations

The study was limited to eighty (80) students between the ages of four, five, and six at Montcalm Elementary School located in Mercer County, West Virginia. The study is also limited to students from the same socio-economic area and 85% of the students receive free or reduced price lunch. The outcomes were determined by use of the Kindergarten Readiness Test, Slosson Educational Publications, Inc. and the Metropolitan Assessment Test, 6th edition, Metropolitan Early Childhood Assessment Program.

Definition of Terms

Developmentally appropriate – based on a knowledge of the typical development of children within a particular age range and at the same time sensitive to individual differences among the children served (NASBE Task Force, 1988)

Head Start – a national program that serves children from birth to five and gives children and their families access to a variety of services offering education and care (WV Head Start State Collaboration Project, 1997)

Kindergarten Four – a transitional kindergarten in public schools that uses developmentally appropriate activities designed for four- year- old children and is funded by Title 1

Kindergarten readiness – children's ability to communicate their own needs, wants, and thoughts verbally and to approach new activities with enthusiasm (Gronlund, Eric Digest, 1993)

Mathematics – way young children view the world and their experiences in it; a way of solving real problems; an understanding of number, operations on number, functions and relations, probability, and measurement (The National Council of Teachers of Mathematics, 1989)

Chapter Two

Review of the Related Literature

The Governor's Cabinet on Children and Families was created as part of West Virginia's 1990-education reform legislation. Its mission is to enhance the ability of families to protect, nurture, educate and support the development of their children so that each child's potential is realized (Pratt, 1997). The purpose of this cabinet is to promote collaboration to assure that children start school ready to learn. Prekindergarten will help prepare these students for being ready to learn when they enter regular kindergarten at age five. Andrews (1995) notes that the reflective manipulation of objects and exchange of views which Piaget states are necessary for the development of logico-mathematical thought are highly visible in good, high quality preschool programs. Children in a program such as this have the prolonged opportunity to explore and talk about the characteristics of shapes, to develop a sense of number, to develop and refine classification skills, to understand one-to-one correspondence and to extend and enrich

mathematical experiences in which children naturally engage during playtime.

According to Stipek, Feiler, Daniels, and Milburn (1995), "More and more kindergartens are adopting prescribed, commercially prepared curricula that are often extensions of textbook series used in the early grades of elementary school and that focus on a narrow set of academic outcomes" (p. 209). Children who enter these programs without preschool experience have a difficult time and many are doomed to failure.

Daniels (1995) feels research studies suggest that children having high quality preschool experience achieve at a higher level than those who do not receive any, both academically and in attitudes to future learning. Gelfer and McCarthy (1994) concur with opinion by stating that children now enter kindergarten with a wide range of skills and past experience in many diverse preschool settings. On the other hand, many children who enter kindergarten without any preschool experience are not ready to participate successfully.

An extensive study conducted by Reynolds, Mavrogenes, Bezruczko, and Hagemann (1996) on the effects of preschool intervention on children's school achievement confirmed that by the sixth grade, children who had the intervention of preschool showed significantly higher reading achievement,

higher math achievement, and lower incidence of grade retention. Cognitive readiness and parent involvement in school significantly mediated the effects of preschool participation on school achievement.

Schweinhart, Berrueta-Clement, Barnett, Epstein, and Weikart (1988) summed it up nicely. They state the following:

> One out of five children lives in poverty. Only 39% of the four-year-olds in families that are below the poverty line attend preschool programs. Yet recent longitudinal studies of early childhood programs – such as the Perry Preschool Study that we are reporting here – have shown that good quality preschool programs can have a beneficial effect on the lives of children reared in poverty. (p.548-549)

Historical Overview

Parents are children's first and most important teachers. Therefore, according to WV Governor's Cabinet on Children and Families (1997), "one of the most powerful ways to encourage early learning is to support parents and strengthen families" (p.3). Wilhoit (1988) states that, "The preschool and early school years are crucial for children and parents. When children

experience success in responsive, high quality programs, they learn essential skills and knowledge, and their parents learn to be confident partners with teachers and administrators" (p.3).

Public schooling for four-year-olds dates back to the 17th century. Bloch, Seward, and Seidlinger (1995) note that four-year-olds as well as older children were given training in reading the Bible as well as practice with numbers by village elders or "dames," if their own parents were unable to do so. In the 19th century, philanthropic organizations and individuals sponsored or financed school programs for young children, including four-year-olds. According to Bloch et al., since the 1930s, different programs that include four-year-olds have been sponsored by the federal government,(WPA nurseries during the depression, Lanham Act day nurseries during World War II, and more recently, Head Start). These have been called "public schooling for four-year-olds". According to Bloch et al., public schooling has been defined as any educational institution operated by publicly elected or appointed school officials and supported by public funds. "While there were variations by state, region, and parental background, four-year-olds were included wherever public school programs existed in colonial America and during the first half of the 19th century" (Bloch et al. p.13). One of the first distinct early childhood programs (specifically for children

under seven) that was developed as part of the urban American public school system was the Lancaster Monitorial school, modeled after the gallery system of education developed in Britain by Joseph Lancaster. In addition, some urban areas had public "infant schools," modeled after those initiated in Great Britain by Robert Owen and Samuel Wilderspin. In some instances, children as young as two attended and were monitored and instructed by older siblings. However, by 1840 the "infant schools" began to decline in popularity and by 1870 they had disappeared. On the other hand, the Urban Lancaster Monitorial schools or their primary successors (called "subprimary classes) continued to include young children into the early decades of the 20th century (Bloch et al., 1995).

At the same time infant schools were declining, a new chapter in the history of four-year-old publicly-financed programs began (Bloch,Seward, and Seidlinger, 1995). The Froebelian kindergarten was introduced as a private school in Watertown, Wisconsin in 1856 by Margarethe Schurz. The first American kindergartens included two or three-year-olds as well as four, five, and six-year-olds in multi-age groups (Bloch et al.).

The first public school kindergarten was started in St. Louis in 1873, with Susan Blow as its first teacher (Bloch, Seward, and Seidlinger, 1995). William H. Harris, who subsequently went on to become the U.S.

superintendent of public school instruction and an advocate for public school kindergarten, sponsored this endeavor. According to Bloch et al., Harris justified public expenditure for the kindergarten and outlined how four-year-olds fit into this system. " The interest in public financing of kindergartens was largely based on the belief that kindergartens could be used to catch children early and teach them good, moral, `American` behavior before they became immoral, too different from the American standard, or, eventually delinquent or criminal" (Bloch et al. p.13). According to Weikart (1989), the belief that early education could be an important social reform, and, for some, an important social control mechanism for society, was explicit and strong in the late 19th and early 20th centuries. Bloch et al. states that these themes have also been implicit in some of the current arguments for four-year-old public programs for "at-risk" children.

However, there was a decline in the number of four-year-olds in public schools with the beginning of public kindergarten in the 1940s and 1950s. This was caused partly by pressures toward single grade primary school classes and financial cuts in public school expenditures. Bloch, Seward, and Seidlinger, (1995) states that there was also a renewed ideological emphasis on the importance of "maternal love and care" for preschoolers at home in the post-World War II era.

Current reasons for promoting four-year-old public school programs include targeting at-risk, low-income, minority children. State and national interest is bolstered by arguments of equity (fewer low-income than middle-income families can afford to send their children to private nursery schools) (Bloch, Seward, and Seidlinger, 1995).

Pressures for Higher Academic Achievement

Although rarely the result of conscious policy decisions, a variety of indirect pressures – such as parental demands for the teaching of reading in kindergarten and accountability testing in higher grades – produced a skill-driven kindergarten curriculum. What once were first grade expectations have been shoved down to kindergarten. These shifts in practice are referred to as the "escalation of curriculum" or "academic trickle-down" (Shepard, 1994). She also found the following:

> Developmentally inappropriate instructional practices, characterized by long periods of seat work, high levels of stress and a plethora of fill-in-the-blank worksheets, placed many children at risk by setting standards for attention spans, social maturity, and academic productivity

that could not be met by many five-year-olds. (p. 207)

Attending a high quality preschool which uses developmentally appropriate practices will at least give children a chance to develop kindergarten readiness skills (Shepard, 1994).

Many states now administer readiness tests to five-year-olds before they are admitted to kindergarten. Because all the readiness measures in use are influenced by past opportunity to learn, a disproportionate number of poor and minority children are identified as unready and are excluded from school when they most need it (Shepard, 1994). Thus children without preschool experience and without extensive literacy experience at home are sent back to the very environments that caused them to score poorly on readiness measures in the first place.

Freeman and Hatch (1989) state that 20 years ago the role of the "good" kindergarten included promoting and maintaining the child's health and physical development and providing a rich environment for living, thinking, and learning. Emphasis was placed on concrete experiences for "cultivating the foundation for the three R's. Today a very different picture of kindergarten programs is presented. Kindergarten programs reflect widespread concern among parents for increased academic achievement. According to a study done by Freeman and Hatch on report cards,

math/math readiness items reflect the expectation that kindergartners should be able to count objects, recognize numerals, and match numerals with sets. Many report cards also record grades on written numerals and rote counting. Freeman and Hatch concluded that children who are not developmentally ready when they begin school might face life-long disadvantages. They believe that the emphasis on skill instruction in today's kindergarten means a reduction of vivid, first hand, worthwhile experiences. Prekindergarten can and should provide these experiences. A study done by Daniels (1995) in England suggests that there were positive educational benefits for children with preschool experience. Overall, children who had received preschool achieved higher scores in both standard assessments and teacher assessments in mathematics.

The first goal of the National Education Goals states that all children in America will start school ready to learn by the year 2000. According to Gronlund (1993), initiating more high quality preschool programs in public schools that are staffed by well-trained teachers who use developmentally appropriate practices will help reach this goal.

Developmentally Appropriate Practices

Although some studies show that didactic programs produce better knowledge of letters and words, the opposite is true for numbers. Children who are taught with a child-centered approach emphasizing the use of manipulatives, score significantly higher on standardized mathematics achievement tests than those who are taught by the didactic method (Stipek, Feiler, Daniels, & Milburn, (1995). According to Andrews (1995), prekindergarten learners should develop mathematical concepts in meaningful, natural, and developmentally appropriate ways. Andrews states that major vehicles for this learning are play centers and self-directed discovery time. Playtime in a kitchen area helps students develop the ability to conceive of objects and situations as if they were something else. It contributes to the later skills of problem-solving and hypothetical reasoning as well as to understanding and using abstract symbols of mathematics. The ability to classify is developed naturally through sorting of foods and kitchen items. Andrews also feels that children learn mathematical concepts in a movement play center. Moving their own bodies through space helps them

develop spatial abilities, such as eye-motor coordination, figure-to-ground perception, position in space, and perception of spatial relationships, that are relevant to the study of mathematics.

According to Schwartz (1996), teachers can and should support children's mathematical progress in activities of their own choosing because children continuously apply their mathematical knowledge and skills in interest-center activities. Schwartz also states that it is essential for teachers to stress the process of thinking rather than the product. Instead of encouraging children to become dependent on authority, teachers should promote empowerment by sending teaching messages that help children develop relationships, practice skills, and apply skills and understanding. Self-esteem can be given a boost by praising students' work. Praising sends a message that the teacher approves of children's actions and products. Praising can also send the message that authority figures are always passing judgment on children's work and ideas and that others are the ones to decide if things are good or bad; therefore, educators of young children need to be careful of the hidden messages in teacher talk (Schwartz, 1996).

"The child invents mathematical knowledge from her or his actions on objects, so direct, concrete experiences with many objects at the child's developmental level are crucial to the formation of accurate concepts"

(Maxim, 1989, p. 36). Teachers must realize that mathematics is not just a process of memorizing correct answers, but that it is a study of the relationships between different things. Maxim also adds that learning is based on the premise of teaching mathematical skills in the context of the child's own play activities, not on structuring specific mathematics lessons. Maxim found the following:

> Educators who use more direct approaches to mathematics teaching with children prior to the age of five are warned that their artificial structure and limitations serve only to lessen interest, exploration, and experimentation if those approaches are introduced before the child has experienced informal number activities. However, once the child has indicated an interest and need, and most will by age five, teachers can organize direct experiences with numbers that help children build desired concepts. (p. 38)

Taylor (1996) believes that learners develop understanding when they are active and seek solutions for themselves. Most educators would agree that teaching for children's understanding is essential.

Many teachers today are using the project or theme approach in early childhood education. According to Trepanier-Street(1995), in the past,

teachers developed themes or units based on what they thought interested children, as well as what the school district or state considered important. In contrast, the project approach is child-centered. Projects may be initiated by an individual child or by a group of children. This approach to curriculum promotes continuity – continuity across time, themes, curriculum areas, school, home, and the outside world. Trepanier-Street also states that:

> When the project approach is implemented in the early childhood classroom, children have the necessary time and multiple, active, concrete experiences to become absorbed and engaged in learning. They are involved in the selection of meaningful, relevant projects, in project development and in on-going evaluation. Through projects, children develop cognitively by learning new concepts or by enriching old concepts and by learning new problem-solving strategies or applying old strategies to new problems. This proves very helpful in the area of mathematics. They have multiple opportunities to represent, to elaborate and to refine their thinking. They view themselves as problem-solvers and transformers of reality and develop a positive attitude toward learning. In these ways, use of the project

approach leads to positive dispositions toward learning, feelings of social competence and enhanced cognitive and social development. (p. 28)

Philosophies of education change with the times, and there will probably never be one educational approach that works best for all children or that captures the imagination of all educators. However, the use of developmentally appropriate practices is one of the best current strategies to ensure that individual children will have opportunities for engaging in meaningful and interesting learning on a daily basis.

Family Involvement

Parental involvement is highly recommended and encouraged in the Title I public school preschool system and in the federal Head Start program. According to Reynolds, Mavrogenes, Bezruczko, and Hagemann (1996), "... parent involvement is the critical force in young children's development" (p. 1123). Because of the stresses associated with poverty and economic hardship, low-income families are often disconnected from schools and other community support systems that are important for healthy

development (Reynolds et al.). The NASBE Task Force (1988) believes programs that serve children in preschool should:

> -promote an environment in which parents are valued as primary influences in their children's lives and are essential partners in the education of their children
>
> -recognize that the self-esteem of parents is integral to the development of the child and should be enhanced by the parents' positive interaction with the school
>
> -include parents in the decision making about their own child and on the overall early childhood program
>
> -assure opportunities and access for parents to observe and volunteer in classrooms
>
> -promote exchange of information and ideas between parents and teachers which will benefit the child
>
> -provide a gradual and supportive transition process from home to school for those young children entering school for the first time (p.19)

Recently, the public schools have been setting up family resource centers. Parents can attend classes and seminars to learn to use manipulatives that will enhance mathematics learning. They can then check

the materials out to be used at home, knowing that the items they have chosen are developmentally appropriate for their child. According to Weikart (1990), one important factor, which contributes to effective education programs is active involvement of parents in developing and operating the program and in parent-training activities.

Ramey, S. and Ramey, C. (1994) recommend that parents become positively involved in their children's education in many ways, including reading to their children, talking to them about specific school-based experiences, playing educational games with them, or discussing life and the world with them. In addition, parents can play a supportive role by being responsive to messages from teachers; by attending school meetings, conferences, and events; by participating in children's field trips; and by volunteering in classrooms. When transitions to school are successful, teachers will know most of their students' parents or guardians. They will feel that they are partners with families in promoting the children's learning and adjustment to school, and they will value what families have to contribute (Ramey and Ramey).

Math Readiness - Kindergarten Level

According to a study conducted by Freeman and Hatch (1989), instruction in the primary grades and beyond is skills-centered, especially in reading and mathematics. "Thus, although the socializing role of kindergarten can hardly be debated, the weight of this role in contrast to other more child-centered roles of kindergarten needs to be reconsidered" (Freeman & Hatch, p. 603). Pasnak, Holt, and Campbell (1991) state that five-year-old children are highly variable in their cognitive functioning. Some are still in the preoperational stage of cognitive development. Their thinking remains closely tied to perceptual properties of the objects they are considering. Consequently, the children frequently classify items inappropriately. Pasnak et al. also add that at the age of five, the mental operation of seriation – arranging objects sequentially according to some gradation of size, space, number, time, shape, etc. is often deficient.

Other children at the age of five evince more cognitive development. They have progressed to an early form of concrete operational thought and suffer less from perceptual intrusions into their thinking processes (Pasnak et al., 1991). In kindergarten, performance on classification, seriation, and conservation problems predicts performance on a variety of standard and

nonstandard achievement measures, such as the following: Metropolitan Achievement Test, Iowa Test of Basic Skills, Mathematics Concepts and Reading, the Primary Abilities Test, and a variety of informal measures contrived by teachers. Significantly, kindergartners' abilities to classify, seriate, and conserve predict their achievement not only in kindergarten but beyond. Therefore, Pasnak et al. feel, preparing children in high quality prekindergartens using developmentally appropriate practices is essential.

Campbell and Ramey (1994) conducted a study to determine if early intervention with a high quality preschool would affect intellectual and academic achievement in children from low-income families. They believed that the children's cognitive development should be enhanced through strengthening the intellectual stimulus value and developmental appropriateness of the early environment. Coming from this "improved" environment, the children should enter school with a greater degree of school readiness and an enhanced likelihood of success. The results of the study showed the intellectual and academic gains were significant and persisted through seven years in school.

The literature reviewed shows that low-income, "at-risk" students can be given the opportunity to attend good, high quality preschool programs in order to attain school readiness. Schools that are staffed with well-trained

teachers who use developmentally appropriate practices and encourage parental involvement in planning and implementing activities will have successful students.

Chapter Three

Methodology

Introduction

The purpose of this study is to determine if children who attend a high quality pre-kindergarten program in a classroom using developmentally appropriate practices are better prepared in mathematics readiness skills and attain higher achievement than do students who do not attend such a program.

Many children enter kindergarten without any prior experience in a program that uses developmentally appropriate practices. Many have not had the privilege of using math manipulatives or playing number games. Because of this, these children are at a disadvantage and find it difficult to achieve at acceptable levels.

Parents of children who do not attend a high quality, developmentally appropriate pre-kindergarten, do not realize the importance of parental involvement. Since the high quality programs in public schools encourage parental involvement, lifelong practices of being involved can be formed. When children stay involved in problem-solving and other mathematics

skills at home, they feel more confident and become more competent (Reynolds, Mavrogenes, Bezruczko, and Hagemann, 1996).

Research Questions

1. Will there be a significant positive effect on kindergarten mathematics readiness by children who experience a developmentally appropriate experience in pre-kindergarten when compared with children who have no prior pre-kindergarten experience?

2. Will there be a significant positive effect in kindergarten mathematics achievement by children who experience a developmentally appropriate experience in pre-kindergarten when compared with children who have no prior pre-kindergarten experience?

Nature of Experiment

Population and Sample

Prior to this study, a meeting was held with the administrator, Title I faculty members, and kindergarten teachers at Montcalm Elementary School. The thesis proposal was presented.

The subjects for the study included 80 students who ranged in age from four to six years old and attend Montcalm Elementary School. This

small rural school of about 400 students is a Title I school and the entire school is serviced by Title I.

Method

A stratified random sample of 80 students from Montcalm Elementary School was chosen to participate in this program. Twenty of the students attended the Title I pre-kindergarten program during the 1997/98 school year. This class was used as one experimental group. Another 20 children are from the Montcalm Elementary School district and have had no prior preschool experience but registered to enter the public school kindergarten program. These children will be used as one control group. Children in the experimental group were tested during March and April, 1998 using the Slosson Kindergarten Readiness Test. The control group was given the same test during kindergarten registration.

The second experimental group consisted of 20 kindergarten students who attended the pre-kindergarten program at Montcalm Elementary the previous year (1996/97). These students were given the Metropolitan Assessment Test, 6th edition. Another 20 students in the kindergarten program who had no preschool experience (the second control group) were given the same test.

Data Collection

Results of the Kindergarten Readiness Test, Slosson Educational Publications, Inc. taken by the first experimental group (children enrolled in the 1997/98 pre-kindergarten program) were compared to the results of the tests taken by the first control group (children who had no pre-kindergarten experience). The Metropolitan Assessment Test, 6th edition, Metropolitan Early Childhood Assessment Program was used to compare achievement between the second experimental group (kindergarten students who did attend pre-kindergarten) and the second control group (kindergarten students who had no pre-kindergarten experience).

Design

A four group, post test design and t-test of gain scores was utilized to test the following research questions:

1. Will there be a significant positive effect on kindergarten mathematics readiness skills by children who have a developmentally appropriate experience in pre-kindergarten when compared with children who have no prior pre-kindergarten experience?

2. Will there be a significant positive effect on kindergarten mathematics achievement by children having a developmentally

appropriate pre-kindergarten experience when compared with children who have no prior pre-kindergarten experience?

Summary

This chapter is designed to represent the research methodology and procedures used to determine the effectiveness of a high quality pre-kindergarten program on kindergarten mathematics readiness skills and achievement.

The study consisted of 80 students who ranged in age from four to six. All the students attend or attended the public kindergarten program at Montcalm Elementary School in southern West Virginia. About half the students also attend or attended the Title 1 pre-kindergarten program offered at Montcalm. Because this is a Title I school and 85% of the school population receives free or reduced price lunches, all students can be considered "at-risk". Since so many students are disadvantaged because of the low socio-economic area, a good quality pre-kindergarten program can be very advantageous. The difference in mathematics readiness and achievement by children who attended the pre-kindergarten should be

apparent by the results of this study. The results and findings are presented in chapter four.

Chapter Four

Results and Findings

Sample

The population of this study included eighty kindergarten, pre-kindergarten and preschool children between the ages of four and six at Montcalm Elementary School in Mercer County, West Virginia. One experimental group, referred to as Experimental Group A, consisted of twenty (20) four and five -year old children who were enrolled in the Title I pre-kindergarten program at Montcalm during the 1997-1998 school year. One control group, referred to as Control Group A, was made up of twenty (20) four and five-year old children from the same area who did not attend any preschool program (see Table I).

Table 1

Sample Population

Group Category	Number in Group	Grade Level of Group
Experimental Group A (Age 4-5)	20	Pre-kindergarten
Control Group A (Age 4-5)	20	Not Enrolled

The second experimental group, referred to as Experimental Group B, included twenty (20) five and six-year-old kindergarten students who attended the Title I pre-kindergarten program at Montcalm during the 1996-1997 school year. The control group, referred to as Control Group B, consisted of twenty (20) five and six-year-old kindergarten students who had no preschool experience (see Table 2).

Table 2

Sample Population

Group Category	Number in Group	Grade Level of Group
Experimental Group B (Age 5-6) Pre-K	20	Kindergarten
Control Group B (Age 5-6) No Pre-K	20	Kindergarten

This data was collected from children who live in a low-economic area and attend a school that is serviced by Title I. Eighty-five percent of students attending this school qualify for free or reduced price meals. Because of the circumstances the students can be considered at-risk. The developmental pre-kindergarten program at Montcalm Elementary is open to

any child who lives in the area. The only criterion is age; child must be four years old.

The purpose of the study was to determine if children who attend a pre-kindergarten that uses developmentally appropriate activities will possess more kindergarten readiness skills in mathematics and will have higher achievement than those who do not attend this kind of facility. There are many steps that need to be taken to ensure readiness for mathematics. If more students are exposed to developmentally appropriate pre-kindergarten experience, they will possess the needed readiness and will have higher achievement.

Results

In the spring of 1998, all children in Experimental Group A (pre-kindergarten students) and Control Group A (no preschool experience), were given the Slosson Kindergarten Readiness Test. The Metropolitan Early Childhood Assessment Program, sixth edition was used to test Experimental Group B (kindergarten students who attended pre-kindergarten) and Control Group B (kindergarten students with no pre-kindergarten). The test scores from each group were then compared.

Hypothesis

H_o: There will be no significant difference in kindergarten readiness and achievement in mathematics for children who attended pre-kindergarten and those who do not receive any preschool experience.

H_1: Children who attended pre-kindergarten will attain higher scores in kindergarten readiness and achievement in mathematics than children who did not attend preschool.

The following table shows descriptive statistics for each group on post-tests. The mean values and standard deviations were calculated to be compared and analyzed.

Table Three

Comparative Mean Table

	X	SD
Experimental Group A	11	1.257
Experimental Group B	24.05	2.544
Control Group A	5.05	2.089
Control Group B	20.4	4.684

The average mean score for the experimental group A, students enrolled in a pre-kindergarten class, is 11 with a standard deviation of 1.257. Control group A, students with no pre-school experience, showed an average mean score of 5.05 with a standard deviation of 2.089.

The average mean score for the experimental group B, kindergarten students who attended pre-kindergarten, is 24.05 with a standard deviation of 2.544. Control group B, kindergarten students who had no pre-kindergarten experience, showed an average mean score of 20.4 with a standard deviation of 4.684.

Main Research Questions

Will there be a significant positive effect on kindergarten mathematics readiness skills by children who had a developmentally appropriate experience in pre-kindergarten when compared with children who had no prior pre-kindergarten experience?

To answer this question, a t-test was performed to compare experimental group A to control group A. The following table shows the results:

Table Four

t-Table

	t	α
ExperimentalA vs Control A	9.77	0.0001

The t-test had an α-level of 0.0001, which indicated a significant difference between test scores of students who attended a pre-school program and those who did not. Therefore, the null hypothesis is rejected that states there will be no significant difference in kindergarten readiness in mathematics between children who attended a pre-kindergarten program and those who did not attend preschool. The alternate hypothesis, which states that there will be significant difference in kindergarten readiness in mathematics between children who attended pre-kindergarten and those who did not attend preschool, is therefore accepted.

Will there be a significant positive effect on kindergarten mathematics achievement by children having a developmentally appropriate experience in

pre-kindergarten when compared with children who have no pre-kindergarten experience?

To answer this question, a t-test was performed to compare experimental group B to control group B. The following table shows the results:

Table Five

t-Table

	t	α
Experimental B vs Control B	7.026	0.0001

An α-level of 0.0001 falls in the rejection region of a 2-tailed test indicating there was a significant difference between test scores of kindergarten students who attended a preschool program and those who did not. Therefore, the null hypothesis, which states that there will be no significant difference in kindergarten achievement in mathematics between children who attended pre-kindergarten and those who did not attend pre-

school will be rejected. The alternate hypothesis, which states that there will be significant difference in kindergarten achievement in mathematics between children who attended pre-kindergarten and those who did not attend preschool, is therefore accepted.

Pre-kindergarten or preschool programs that use developmentally appropriate practices in preparing four-year-old children for future success in mathematics appear to make a difference, especially for at-risk students.

Chapter Five

Summary, Conclusions, and Recommendations

Summary

This study involved eighty (80) four, five, and six-year old students at Montcalm Elementary School. Twenty of the five-year-olds had no school experience at all and were tested with the Slosson Kindergarten Readiness Test when registering for kindergarten. The same test was given to another twenty students who were attending pre-kindergarten at Montcalm Elementary School. Twenty of the five and six-year-old kindergarten students enrolled at Montcalm Elementary School who had attended preschool were given the Metropolitan Assessment Test, 6th Edition. This same test was administered to twenty kindergarteners at Montcalm Elementary School who had no pre-school experience.

The intent of this study was to determine if attending a quality pre-kindergarten program would improve kindergarten mathematics readiness skills and kindergarten mathematics achievement. This study showed that mathematics readiness skills and achievement were significantly improved when students attended pre-school. A comparison of mean values as well as t-tests was performed to reach these conclusions. The design for this

investigation was a four group, post-test design. The data was analyzed using a t-test of gain scores.

Conclusions

From the results of this study, it was concluded that mathematics readiness skills and achievement were significantly improved when students received good quality preschool experience. On the tests, experimental group A (pre-kindergarten class) had a mean value of 11 and control group A (five-year-olds with no pre-school experience) had a mean value of 5 which shows a significant difference. Experimental group B (kindergarten students with pre-school experience) had a mean value of 24.05 and control group B (kindergarten students with no pre-school experience) had a mean value of 20.40 which also shows a significant difference. A t-test, which was conducted on the data also indicated a significant difference. An α level of 0.0001 and a t-score of 9.77 was achieved when comparing scores of experimental group A with control group A. An α level of 0.0001 and a t-score of 7.026 was achieved when comparing experimental group B with control group B. This clearly indicated a significant difference in students who attend preschool and those who do not.

Recommendations

A possibility for further research may include a comparison between males and females participating in the study. Another possibility may be to extend the study further, possibly through the elementary years to see if there is still a significant difference in achievement.

This study was conducted in a Title 1 elementary school located in a low-socio, low-economic area. It would be interesting to find out if the results would be the same in other areas.

In the county where this study was done, there are waiting lists for children to attend the Kindergarten Four program. Only students who attend a Title I school have access to the benefit of this opportunity. From the results of this study, this program should be made available to any student who can benefit from it.

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